

SOIL ENGINEERING REPORT

23, Links Way,

Northwood,

Middlesex,

HA5 2XA

CLIENT: Mr Dixit Joshi.

REPORT NO:162163 AMENDED

DATE: May 2017

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23, Linksway Northwood,

Middlesex.

1.INTRODUCTION.

This Soil Engineering report was prepared at the request of Mr Dixit Joshi. The object of the investigation was to determine the foundation requirements to the proposed detached dwelling.

2. TOPOGRAPHY

The site currently consists of an existing property known as No. 23 Linksway, Northwood, Ruislip. The site is relatively flat with numerous mature trees including Fruit, Yew, Oak and Lime trees.

3. SITEWORK

The investigation included:

3 No Hand Augers excavated to a depth
of 2.0M

2 No. Window Samples excavated to a
depth of 4.0M

1 No.7.0m deep borehole

In positions indicated on the site location plan Appendix A.

It should be noted that this report is based upon data derived from the Hand Augers/Window Sample/ borehole records and subsequent laboratory testing.

Attention is drawn to the possibility of variations in soil strength and classification and ground water conditions occurring around and between Hand Augers/Window Samples/ borehole positions.

Obviously, this report cannot include recommendations for engineering works for soil and ground water variations not encountered during the investigation and we cannot be held responsible for any associated extra over costs incurred, as a result of unforeseen ground conditions.

Ground water levels are recorded during and on completion of the field work and the results included as such within the Hand Auger / Window Sample and Borehole section sheets – Appendix B.

To record the equilibrium ground water level and variations of this level with time, it is necessary to install piezometers or standpipes, in accordance with B.S. 5930:1981. Unless these form part of the site investigation works, we cannot be held responsible for variations in ground water levels caused by seasonal variations and land drainage etc.

4. SAMPLING

During the site investigation the following samples were collected at depths referred to within the Hand Augers/Window Sample / borehole section sheets. The samples were subsequently taken to the laboratory for identification and to be included in a detailed testing procedure.

- Disturbed samples in small airtight bags.
- Bulk samples in large airtight bags.

All samples were taken in accordance with B.S. 5930:1981 – Code of Practice for Site Investigations.

5.FIELD TESTING

The following insitu testing was carried out to determine the mechanical characteristics of the soil.

1. Insitu Shear Strengths were recorded using Hand Shear Vane equipment – on relatively large undisturbed samples of soil.
2. Insitu Standard Penetration Tests were carried out within the 7.0M Borehole to record the insitu densities of the soil encountered.

The test was carried out in accordance with B.S. 5930.

Details of the test results are given in Appendix B – Hand Auger /Window Sample Section Sheets.

6. LABORATORY TESTING

The following test were carried out to determine the physical and mechanical properties of the soil, using representative soil and water samples collected during the fieldwork:

- a) Sulphate Content and PH Value Determination.
- b) Moisture Content Determination.
- c) Atterberg Limit Determination.
- d) Particle Size Analysis

The results of the tests can be found within Appendix C – Laboratory Test results.

7. GEOLOGY

Referring to the I.G.S. Notes for the area and sheet No: 256, it would appear that the following geology applies to the site:

Reading Beds - Eocene

During the course of the fieldwork a subsoil profile was proved which can be summarised as follows:

Shallow Made Ground deposits

Overlying

Firm/stiff orange brown very silty clay.

Overlying

Medium Dense Light Grey & Green Sand

It was considered that the above deposits were consistent with the Woolwich & Reading Bed deposits.

8. ENGINEERING DISCUSSION

During the fieldwork disturbed samples of the upper Clay deposits were collected and taken to the laboratory where Atterberg Limit tests were carried out. The test results proved the deposits to be of medium plasticity with plasticity index of 24%. The clay deposits were proved to vary from 0.7, 0.8, 1.5 & 2.7M in depth.

In view of the above the Clay deposits are prone to volumetric changes due to existing and proposed tree planting and climatic conditions, hence foundations will need to be designed to

Given the relatively shallow depths to the clay, apart from Window Sample B @ 2.7M, it is considered that Trench Fill foundations could be utilised for the development and should be the most economical solution.

The following details should be included within the design of the foundations:

1. Foundation widths should be assessed to ensure that an allowable bearing pressure of $175\text{KN}/\text{M}^2$ is not exceeded for widths up to 1500mm.
2. Foundation depths to be a minimum depth of 2000mm below existing ground level. Actual depths will also be subject to N.H.B.C. and or Local Authority approval and must extend beyond all clay based subsoils.
3. Foundations should consist of a minimum concreted depth of 600mm reinforced with C385 fabric placed top and bottom.
4. Foundation concrete to be Grade C30 with a minimum cement content of $300\text{kg}/\text{M}^3$ o.p.c. Maximum water content ratio of 0.6.
5. Where foundation depths exceed 1.5M the inside face of the external foundations must be lined with an approved compressible medium. Termination within the underlying sand deposits.
6. All foundations must penetrate all fill depths and existing foundations, to be constructed upon:
 - Medium Dense light Grey & Green Fine Sand.

9. Specification of Below Ground Concrete

During the fieldwork disturbed samples of the London Clay were collected and taken to the laboratory where Sulphate and Ph test were carried out. These test results should be used to determine the specification of concrete below ground in accordance with BRE Special Digest "Specification of concrete below ground".

10. Soakage Tests

During the course of the borehole works Falling Head Permeability tests were carried out.

The results of these tests are tabulated below:

Soil Strata – Fine Sand

Test 1	Depth Water	Time elapsed (minutes)
	0.30	1 min
	0.61	2 min
	0.77	3 min
	0.85	4 min
	0.95	5 min
	1.01	6 min
	1.08	7 min
	1.10	8 min
	1.14	9 min

1.17	10 min
------	--------

1.20	11 min
------	--------

Test 1 cont.	Depth Water	Time Elapsed.
	1.24	12 min
	1.30	13 min
	1.36	14 min
	1.43	15 min
	1.58	20 min
	1.64	25 min
	1.73	30 min
	1.78	35 min
	1.82	40 min
	1.85	45 min

Test 2

0.04	1 min
0.06	2 min
0.06	3 min
0.07	4 min
0.07	5 min
0.08	6 min
0.08	7 min
0.09	8 min
0.09	8 min

	0.10	9 min
	0.10	9 min
Test 2 continued	Depth Water	Time Elapsed.
	0.10	10 min
	0.10	11 min
	0.12	12 min
	0.12	13 min
	0.17	14 min
	0.30	15 min
	0.36	20 min
	0.43	25 min
	0.50	30 min

ENVIROCHECK REPORT

1. Agency & Hydrological

B.G.S. ground water flooding susceptibility @ 251 – 500M from the site – see sensitivity map.

2. Waste.

Potentially, infilled land at a distance of 315M from the site.

London Borough Hillingdon were not been able to supply

Landfill data.

The Clay capping to the Woolwich and Reading Beds should significantly prevent lateral leaching of contamination.

3. Geological

B.G. soil chemical tests were reported at distances of 37M from the site and were considered, but were not sufficient in number to be of use. Disturbed samples were collected during the site investigation and sent to the laboratory for chemical analysis - results are awaited.

4. Industrial Land Uses.

Nearest Light Industrial land uses were reported at 368 & 415M and beyond from the site. Given the impermeable nature of the subsoils none of the reported uses were considered to have any significant effect on the site.

5. Historical Maps.

- Earliest map dated 1868 1:10560 woodland use noted.
- Map dated 1935 – 1960 1:10560 shows gradual housing development occurring in the area.
- Map dated 1965 – 1968 shows more intense housing development
- Map dated 2017 shows little further development in this area.

- Map dated 1965 – 1968 shows more intense housing development
- Map dated 2017 shows little further development in this area.

6. Sensitivity Map.

This map indicates there is a significant risk of surface water flooding adjacent to the site, should a 1 in 100 years storm occur.

7. B.G.S. Chemistry Estimated Results.

Arsenic	<15mg/kg
Cadmium	< 1.8mg/kg
Chromium	90 – 120mg/kg
Lead	<100mg/kg
Nickel	<15-30mg/kg

The above chemistry results are estimated and must be confirmed by on site testing to determine whether any action levels are exceeded.

12. Chemical Contamination

During the fieldwork disturbed samples B1 @ 0.5-1.0M & WSA @ 0.5 – 1.0M . The samples were taken to the laboratory and analysis carried out.

Environmental specialists have been consulted to review the results and have provided the necessary risk analysis.

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed.

All the results are less than the Tier 1 GAC. From the assessment it is considered that contaminant levels will not pose a significant risk to human health.

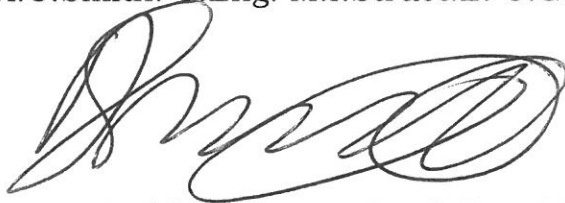
The results of the chemical analysis are attached within Appendix C.

For and on behalf of

Palladium Consulting Engineers Limited.

A handwritten signature in black ink, consisting of a series of loops and curves, representing the signature of A.C. Smith.

A.C.Smith. C.Eng. M.I.Struct.E. C.Geol. F.G.S.

A handwritten signature in black ink, featuring a large, stylized 'D' followed by several loops and curves, representing the signature of D.K.C. Smith.

D.K.C.Smith. B.Eng. M.Sc. C.Eng. M.I.Struct.E.

Appendix A

Window Sample & Borehole Location Plan

Appendix B

Window Sample & Borehole Section Sheets

Palladium Consulting Engineers

Telephone : Stevenage (01438) 861961

BOREHOLE LOG

Borehole BH1

Sheet 1 of 1

Sheet 1 of 1

Method Light Cable Percussion.		Date 15/04/17		Site 23 Linksway, Northwood.		
Dia mm 150		Coord		Ground Level m O.D.		
Client						
Soil Samples/Tests		Casing [Water] Depths m	Field Records	Legend	Depth m.	Description of Strata (thickness in m.) [reduced level in m.]
Type/Test	Depth m.					
B1	0.50 - 1.00				0.05 0.15 0.40	SLAB (0.05) CEMENTED SAND (0.10) CONCRETE (0.25)
D1 U1 (90)	1.30 1.50 - 1.85	1.50			1.00	Stiff mottled light greyish brown and orangish brown CLAY with occasional fine sand/silt pockets and decayed roots (LAMBETH GROUP) (0.60)
D2 S1 (30) D3	1.90 2.05 - 2.35 1.90	1.50			1.80 2.10	Stiff orange slightly sandy silty CLAY with occasional grey veins and decayed and recently active roots (LAMBETH GROUP) (0.80)
B2	2.50 - 3.00					Mottled orangish brown and grey very clayey medium SAND becoming olive yellow clayey silty fine and medium SAND with occasional stiff and firm clayey lumps (LAMBETH GROUP) (0.30)
D4 S2 (54)	3.40 3.55 - 3.85	3.20				Very dense locally dense pale olive silty fine and medium SAND (LAMBETH GROUP) (3.90)
B3	4.50 - 5.00					
D5 S3 (48)	5.00 5.15 - 5.45	5.00				
B4	6.00 - 6.50					
D6 S4 (52)	6.55 6.70 - 7.00	6.20			6.00 7.00	Very dense green silty fine and medium SAND with rare soft brown clay pockets (LAMBETH GROUP) (1.00)
						BOREHOLE COMPLETED AT 7.00m

Remarks

Hand dug pit to 1.20m to check for services
Permeability test carried out at 2.00m
Water was added to assist drilling from 2.00m to 6.00m

Logged by

JCG

Scale

1:50

End Casing Depth

m. 6.20

Job No.

S31185

Sample/Test key:

U() U100 Sample (blows) S () Standard (N value)
D Disturbed sample C () Cone (N value)
B Bulk sample * Blows and penetration
W Water sample when 300mm not
Progress & Day achieved
Groundwater level

Penetration Tests

Page

GEOPROBE ENVIRONMENTAL LTD					Window Sample No A
Contract Links Way, Northwood					Report No GPE 17/042
Client Palladium					Date 4/4/17
Site Address 23, Links Way, Northwood, Middlesex, HA6 2XA					Ground Level , mOD
Type of Excavator Window sampler		Water level after completion, m None			
Water Strikes, m		Pit Dimensions, m		Ease of Excavation, m	
1 None		Length 100mmφ		Very Easy ☐	
2		Breadth		Difficult ☐	
				Moderate ☒	
				Very hard ☐	
Observations:					
Sample Type	Depth, m	Cohesion SPT	Depth	Legend	Description
D	1.00	H.V. = 105kPa	0.40		Made ground (Grass over brown topsoil with occasional brick rubble and roots)
					Firm becoming stiff orange-brown silty CLAY with veins of grey clay and rare gravel in upper levels
D	2.00	16	1.50		orange-brown and pale blue-grey mottled silty SAND
D	3.00	28	2.70		Medium dense becoming very dense pale brown silty SAND
D	4.00	73+	4.00		End of sample hole

Code:

D – disturbed sample

W – Water sample

GEOPROBE ENVIRONMENTAL LTD				Window Sample No B	
Contract Links Way, Northwood				Report No GPE 17/042	
Client Palladium				Date 4/4/17	
Site Address 23, Links Way, Northwood, Middlesex, HA6 2XA				Ground Level , mOD	
Type of Excavator		Window sampler		Water level after completion, m None	
Water Strikes, m		Pit Dimensions, m		Ease of Excavation, m	
1 None		Length 100mmφ		Very Easy ☐	
2		Breadth		Difficult ☐	
				Moderate ☒	
				Very hard ☐	
Observations:					
Sample Type	Depth, m	Cohesion SPT	Depth	Legend	Description
D	1.00	H.V. = 70kPa	0.40		Made ground (Grass over brown topsoil with occasional brick rubble and roots)
					Firm becoming stiff orange-brown silty CLAY with veins of grey clay and rare gravel in upper levels
D	2.00	H.V. = 140kPa			
			2.70		
D	3.00	16			Medium dense pale orangish brown very silty SAND grading to thinly interbedded silty sand and clay
D	4.00	18	4.00		End of sample hole

GEOPROBE ENVIRONMENTAL LTD					Auger Hole No C
Contract Links Way, Northwood					Report No GPE 17/042
Client Palladium					Date 4/4/17
Site Address 23, Links Way, Northwood, Middlesex, HA6 2XA					Ground Level , mOD
Type of Excavator Manual		Water level after completion, m None			
Water Strikes, m		Pit Dimensions, m			
1 None	Length 100mmφ	Ease of Excavation, m			
2	Breadth	Very Easy ☐ Difficult ☐			
		Moderate ☒ Very hard ☐			
Observations: Unable to auger below 2.10m					
Sample Type	Depth, m	Cohesion SPT	Depth	Legend	Description
D	1.00		0.30		Made ground (Grass over brown topsoil with roots)
			0.70		Orange-brown very silty sandy CLAY
					Pale grey becoming greenish grey silty SAND
D	1.80 - 2.00		2.10		End of sample hole

Code: D – disturbed sample W – Water sample

GEOPROBE ENVIRONMENTAL LTD					Auger Hole No	D
Contract Links Way, Northwood					Report No	GPE 17/042
Client Palladium					Date	4/4/17
Site Address 23, Links Way, Northwood, Middlesex, HA6 2XA					Ground Level , mOD	
Type of Excavator		Manual		Water level after completion, m		None
Water Strikes, m		Pit Dimensions, m		Ease of Excavation, m		
1 None		Length 100mmφ		Very Easy		☐
2		Breadth		Moderate		☒
				Difficult		☐
				Very hard		☐
Observations: Unable to auger below 2.10m						
Sample Type	Depth, m	Cohesion SPT	Depth	Legend	Description	
D	1.00		0.25		Made ground (Grass over brown topsoil with roots)	
			0.80		Orange-brown very silty sandy CLAY	
D	2.00		2.10		Pale grey silty SAND	
					End of sample hole	

GEOPROBE ENVIRONMENTAL LTD					Auger Hole No	E
Contract Links Way, Northwood					Report No	GPE 17/042
Client Palladium					Date	4/4/17
Site Address 23, Links Way, Northwood, Middlesex, HA6 2XA					Ground Level , mOD	
Type of Excavator		Manual	Water level after completion, m		None	
Water Strikes, m		Pit Dimensions, m		Ease of Excavation, m		
1	None	Length	100mmφ	Very Easy	☐	Difficult
2		Breadth		Moderate	☒	Very hard
Observations: Unable to auger below 2.20m						
Sample Type	Depth, m	Cohesion SPT	Depth	Legend	Description	
D	1.00		0.25		Made ground (Grass over brown topsoil with roots)	
					Orange-brown and grey mottled very silty CLAY with roots	
D	2.00		1.95		Pale grey silty SAND	
			2.20		End of sample hole	

Code: D – disturbed sample W – Water sample



TEST REPORT.

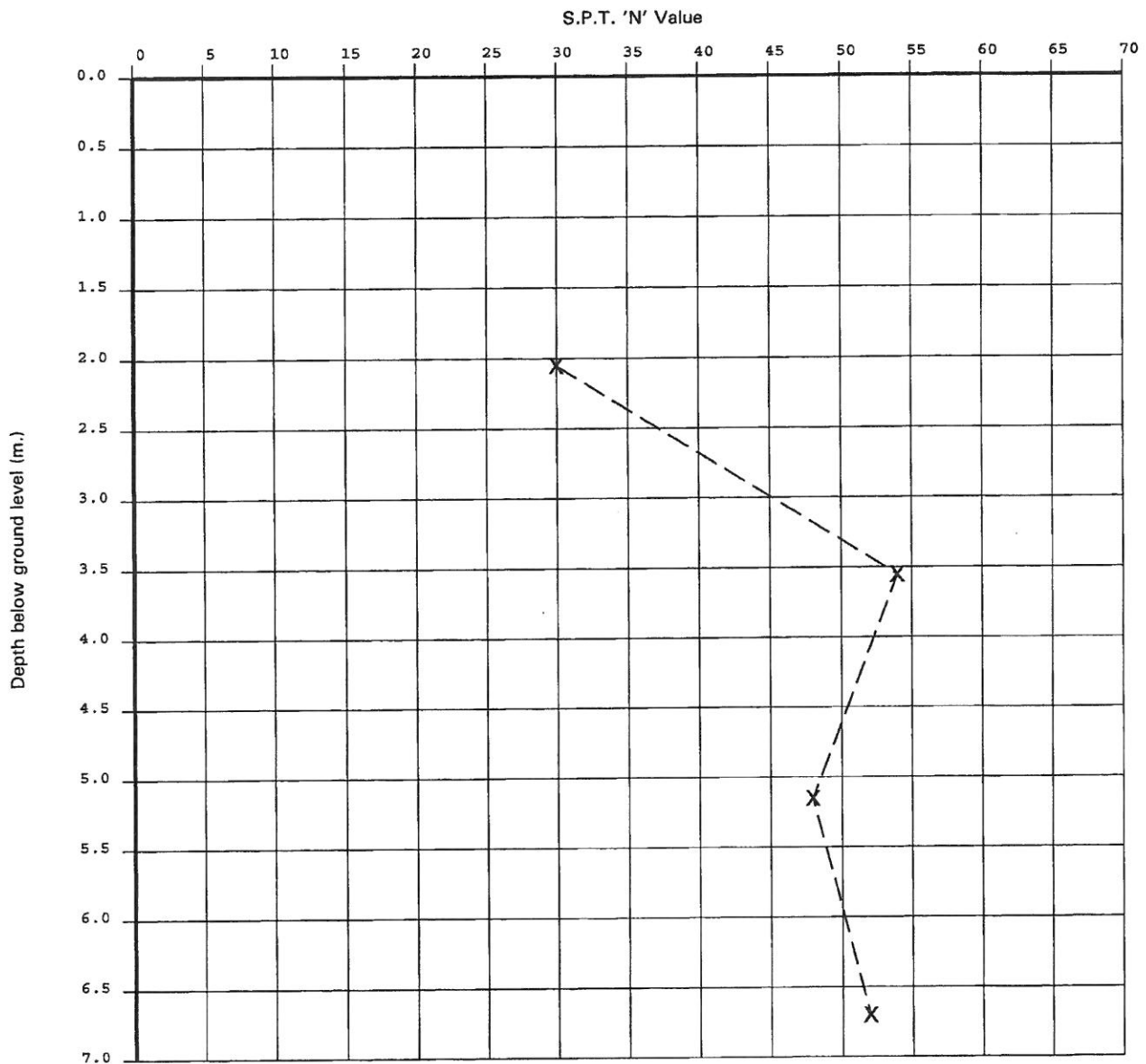
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S.P.T. 'N' Value vs Depth below ground level (m.).



Key to
Data Points

X: BH1

Appendix C

Laboratory Test Results



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DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

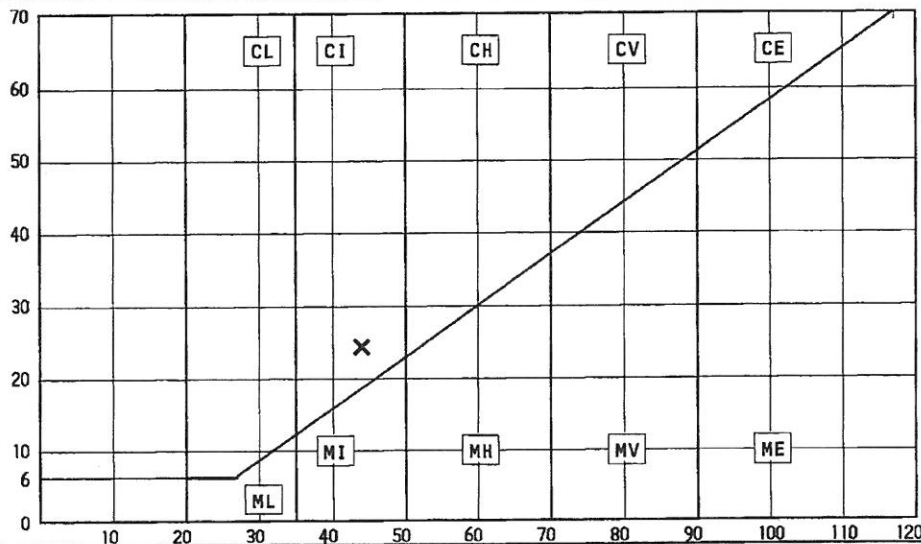
Borehole/ Pit No.	Depth m.	Sample	Moisture Content %	Description	Remarks
BH1	1.30	D1	19	Stiff orange slightly sandy silty CLAY with occasional grey veins and decayed and recently active roots	

PREPARATION				Liquid Limit	44 %
Method of Preparation Specimen from Natural Soil				Plastic Limit	20 %
Sample retained 0.425 sieve (Assumed) 0 %				Plasticity Index	24 %
Corrected moisture content for material passing 0.425mm %				Liquidity Index	-0.04
Curing Time 24 Hours				Clay Content	Not analysed. %
				Derived Activity (PI/CC)	Not analysed.

C = CLAY

Plasticity
Index %
(I_p)

M = SILT



High
Medium
Low
NHBC Volume Change Potential

Liquid Limit %

METHOD OF PREPARATION: BS 1377:PART 1:1990:7.4 & PART 2:1990:4.2

METHOD OF TEST : BS 1377:PART 2:1990:3.2, 4.4, 5.3, 5.4

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS : PLASTICITY CHART BS5930:1999:Figure 18
VOLUME CHANGE POTENTIAL: NHBC Standards Chapter 4.2 Unmodified Plasticity Index
NOTE: Modified Plasticity Index I_p' = I_p x (% less than 425 microns/100)



TEST REPORT.

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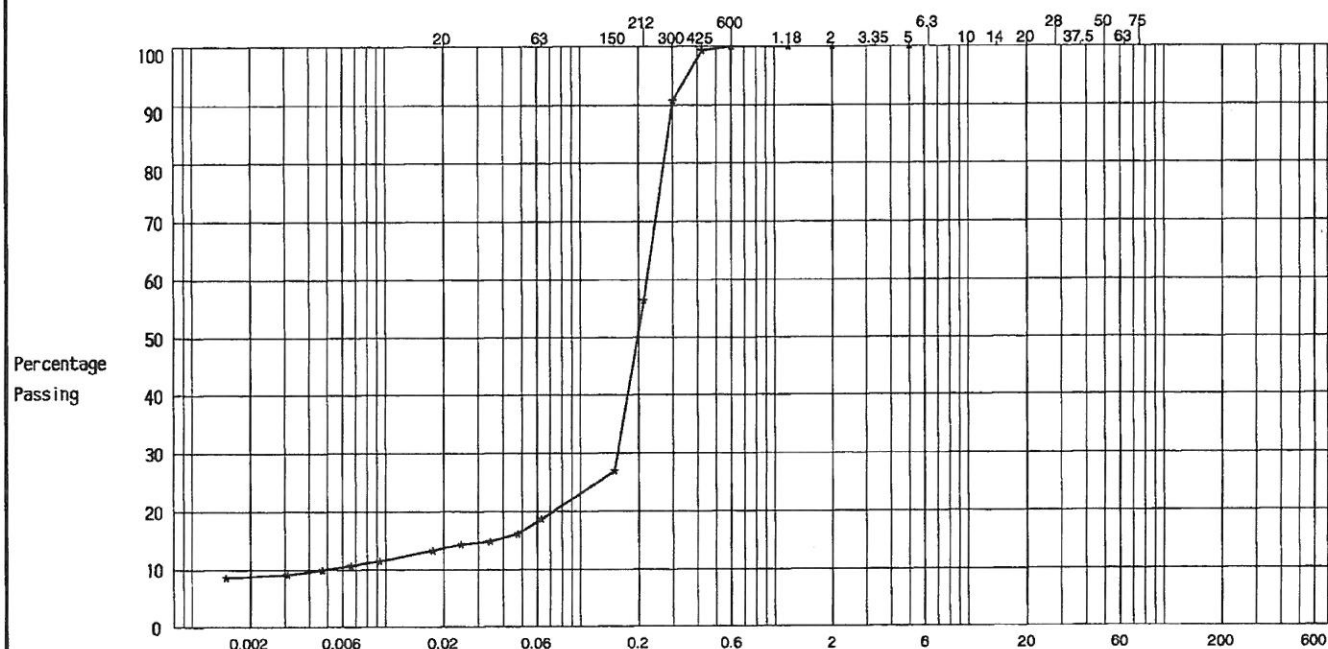
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole/ Pit No.	Depth m.	Sample	Description	Remarks
BH1	1.90	D3	Olive yellow clayey silty fine and medium SAND with rare firm clay lumps	

Method of Test: Wet Sieve + Hydrometer

Method of pre-treatment: Not required

Size (microns)																Size (mm)														
Sieve Size					1.5	3.1	4.7	6.6	9.3	17.5	24.4	34.3	47.6	63	150	212	300	425	600	1.18	2	5	6.3	10	14	20	28	37.5	50	75
Percentage by Mass passing Sieve					9	9	10	11	11	13	14	15	16	19	27	56	91	99	100	100	100	100	-	-	-	-	-	-	-	-



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

METHOD OF PREPARATION: BS 1377:PART 1:1990:7.3 & 7.4.5

METHOD OF TEST : BS 1377:PART 2:1990:9.2 + 9.5

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS :

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.



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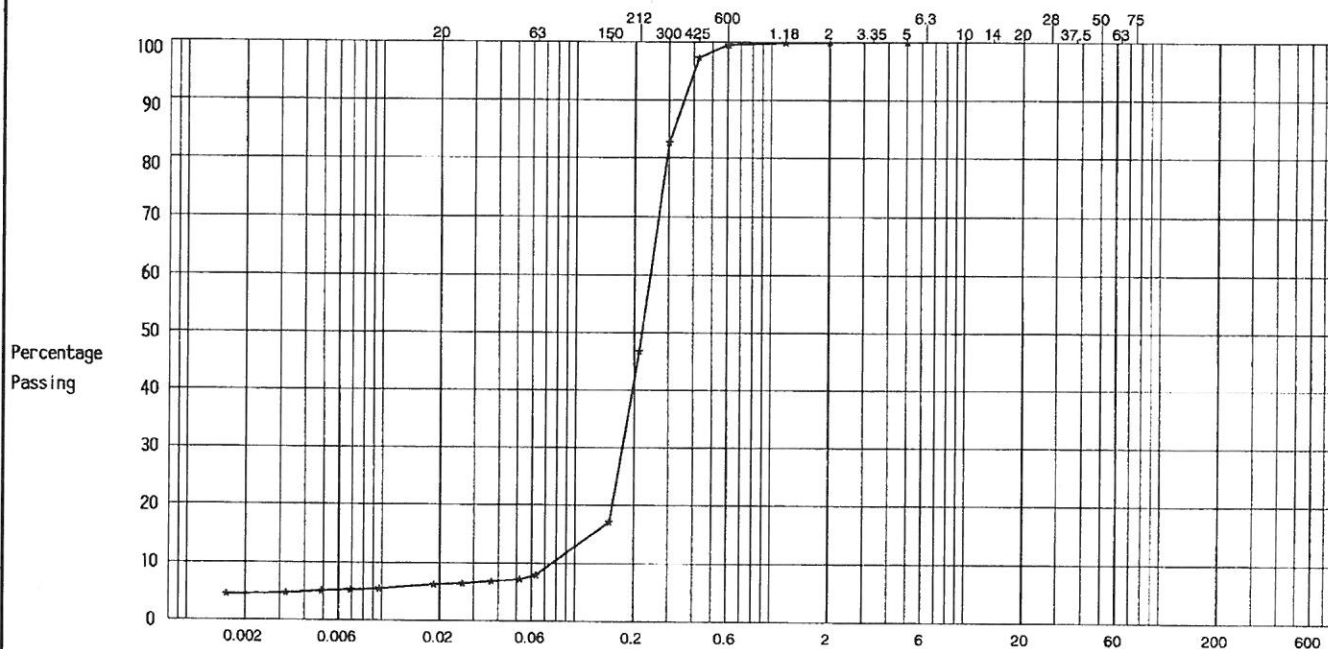
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole/ Pit No.	Depth m.	Sample	Description	Remarks
BH1	3.40	D4	Pale olive silty fine and medium SAND	

Method of Test: Wet Sieve + Hydrometer

Method of pre-treatment: Not required

Size (microns)															Size (mm)										
Sieve Size																									
Percentage by Mass passing Sieve																									



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

METHOD OF PREPARATION: BS 1377:PART 1:1990:7.3 & 7.4.5

METHOD OF TEST : BS 1377:PART 2:1990:9.2 + 9.5

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS :

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.



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DETERMINATION OF THE SULPHATE CONTENT OF SOIL AND GROUNDWATER

Borehole/ Pit No.	Depth m.	Sample	Concentration of Soluble Sulphate			% of sample passing 2mm sieve	Description	Remarks
			Soil	Water	Groundwater			
			Acid Soluble SO ₃ %	Soluble 2:1 SO ₃ g/l	g/l			
BH1	1.30	D1		0.02		100	Stiff orange slightly sandy silty CLAY with occasional grey veins and decayed and recently active roots	
BH1	1.90	D3		0.04		100	Olive yellow clayey silty fine and medium SAND with rare firm clay lumps	
BH1	3.40	D4		0.01		100	Pale olive silty fine and medium SAND	

METHOD OF PREPARATION: BS 1377:PART 1:1990:7.5 BS1377:PART 3:1990:5.2 Acid Soluble, 5.3 Soil/Water Extract

METHOD OF TEST : BS 1377:PART 3:1990:5.5 :5.4 Groundwater

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS : Test not UKAS accredited.

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.

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DETERMINATION OF THE pH VALUE

Borehole/ Pit No.	Depth m.	Sample	pH Value	Description	Remarks
BH1	1.30	D1	5.0	Stiff orange slightly sandy silty CLAY with occasional grey veins and decayed and recently active roots	
BH1	1.90	D3	7.5	Olive yellow clayey silty fine and medium SAND with rare firm clay lumps	
BH1	3.40	D4	7.8	Pale olive silty fine and medium SAND	

METHOD OF PREPARATION: BS 1377:PART 1:1990:7 BS 1377:PART 3:1990:9.4

METHOD OF TEST : BS 1377:PART 3:1990:9.5

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample,
C = Core Cutter

COMMENTS : Test not UKAS accredited.

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.



2 Shaftesbury Industrial Centre, Icknield Way, Letchworth Garden City, Hertfordshire, SG6 1HE
T +44 (0)1462 480 400, F +44 (0)1462 480 403, E rpsmh@rpsgroup.com, W rpsgroup.com

Results Summary

Report No.: 17-62639-1

Customer Reference: Not Supplied

Customer Order No: 2163

Customer Sample No						B1	WSA
RPS Sample No						331473	331474
Sample Type						SOIL	SOIL
Sample Depth (m)						0.5-1	0.5-1
Sampling Date						04/04/2017	04/04/2017
Determinand	CAS No	Codes	SOP	Units	RL		
aliphatic hydrocarbons C08-C10		NS	in house	mg/kg	1	< 1.00	< 1.00
aliphatic hydrocarbons C10-C12		NS	in house	mg/kg	1	< 1.50	< 1.50
aliphatic hydrocarbons C12-C16		NS	in house	mg/kg	1	< 1.20	< 1.20
aliphatic hydrocarbons C16-C21		NS	in house	mg/kg	1	< 1.50	< 1.50
aliphatic hydrocarbons C21-C35		NS	in house	mg/kg	1	< 3.40	< 3.40
aromatic hydrocarbons C08-C10		NS	in house	mg/kg	1	< 1.00	< 1.00
aromatic hydrocarbons C10-C12		NS	in house	mg/kg	1	< 1.00	< 1.00
aromatic hydrocarbons C12-C16		NS	in house	mg/kg	1	< 1.00	< 1.00
aromatic hydrocarbons C16-C21		NS	in house	mg/kg	1	< 1.00	< 1.00
aromatic hydrocarbons C21-C35		NS	in house	mg/kg	1	< 1.40	< 1.40
acenaphthene	83-32-9	NS	in house	mg/kg	0.1	< 0.10	< 1.00
acenaphthylene	208-96-8	NS	in house	mg/kg	0.1	< 0.10	< 1.00
anthracene	120-12-7	NS	in house	mg/kg	0.1	< 0.10	< 1.00
arsenic	7440-38-2	NS	in house	mg/kg	1	9.50	8.10
boron	7440-42-8	NS	in house	mg/kg	0.5	< 0.5	< 0.5
benzo(a)anthracene	56-55-3	NS	in house	mg/kg	0.1	< 0.10	< 1.00
benzo(a)pyrene	50-32-8	NS	in house	mg/kg	0.1	< 0.10	< 1.00
benzo(b)fluoranthene	205-99-2	NS	in house	mg/kg	0.1	< 0.10	< 1.00
benzo(g,h,i)perylene	191-24-2	NS	in house	mg/kg	0.1	< 0.10	< 1.00
benzo(k)fluoranthene	207-08-9	NS	in house	mg/kg	0.1	< 0.10	< 1.00
cadmium	7440-43-9	NS	in house	mg/kg	0.2	< 0.20	< 0.20
chrysene	218-01-9	NS	in house	mg/kg	0.1	< 0.10	< 1.00
chromium	7440-47-3	NS	in house	mg/kg	1	32.0	15.0
copper	7440-50-8	NS	in house	mg/kg	1	19.0	12.0
dibenzo(a,h)anthracene	53-70-3	NS	in house	mg/kg	0.1	< 0.10	< 1.00
fluoranthene	206-44-0	NS	in house	mg/kg	0.1	< 0.10	< 1.00
fluorene	86-73-7	NS	in house	mg/kg	0.1	< 0.10	< 1.00
mercury	7439-97-6	NS	in house	mg/kg	0.3	< 0.30	0.43
indeno(1,2,3-c,d)pyrene	193-39-5	NS	in house	mg/kg	0.1	< 0.10	< 1.00
naphthalene	91-20-3	NS	in house	mg/kg	0.1	< 0.10	< 1.00
nickel	7440-02-0	NS	in house	mg/kg	0	26.0	10.0
lead	7439-92-1	MS	in house	mg/kg	1	12.0	36.0
phenanthrene	85-01-8	NS	in house	mg/kg	0.1	< 0.10	< 1.00



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Results Summary

Report No.: 17-62639-1

Customer Reference: Not Supplied

Customer Order No: 2163

Customer Sample No						B1	WSA
RPS Sample No						331473	331474
Sample Type						SOIL	SOIL
Sample Depth (m)						0.5-1	0.5-1
Sampling Date						04/04/2017	04/04/2017
Determinand	CAS No	Codes	SOP	Units	RL		
pyrene	129-00-0	NS	in house	mg/kg	0.1	< 0.10	< 1.00
sulfate (WAC, as mg/l in leachate)	14808-79-8	NS	in house	mg/l	2	91.0	11.0
selenium	7782-49-2	NS	in house	mg/kg	0.5	< 0.50	0.70
total petroleum hydrocarbons by GCFID (C8 - C40)		NS	in house	mg/kg	5	< 10.0	< 10.0
vanadium	7440-62-2	NS	in house	mg/kg	0.1	59.0	30.0
zinc	7440-66-6	MS	2301#	mg/kg	0.1	51.0	37.0
pH		NS	in house	pH units	0.1	6.30	9.20